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ONE SHARE/ONE VOTE AND THE  
MARKET FOR CORPORATE CONTROL

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and  
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Number 440

February 1987

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## 1.1 INTRODUCTION

A corporation's securities provide the holder with particular claims on the firm's income stream and particular voting rights. These securities can be designed in various ways: one share of a particular class may have a claim to votes which is disproportionately larger or smaller than its claim to income. In this paper we analyze some of the forces which make it desirable to set up the corporation so that all securities have the same proportion of votes as their claim to income ("one share/one vote").

Although the literature has emphasized that there are agency problems created by the delegation of control to management, it has not established that a one share/one vote security structure is the solution to these problems. For example, Easterbrook and Fischel write "As the residual claimants, the shareholders are the group with the appropriate incentives (collective choice problems to one side) to make discretionary decisions" (1983, p.403).<sup>1/</sup> In practice, of course, as Easterbrook and Fischel recognize, collective choice problems cannot be left to one side, and it is presumably for this reason that shareholders delegate many discretionary decisions to management. This delegation creates a conflict of interest between those who make decisions and those who bear the consequences, which may be mitigated by giving management a claim to the firm's profit. Note, however, that this agency problem does not bear directly on the security-vote structure; it implies only that management should receive performance-based compensation. It is also clear that while shareholders collectively have an incentive to monitor management -- and hence tying votes to shares may be desirable to allow them to act on this incentive -- such monitoring is likely to be effective only when a single party becomes large enough to overcome collective choice problems.<sup>2/</sup> We are thus led to explore how a firm's security structure affects the market for corporate control.

We show that security structure influences both the conditions under which a control change takes place and the terms on which it occurs. First, as is fairly clear, the allocation of voting rights to securities determines which securities a party must acquire in order to win control. Secondly, the assignment of income claims to the same securities determines the cost of acquiring these voting rights. We will show that it is in shareholders' interest to set the cost of acquiring control to be as large as possible, consistent with a control change occurring whenever this increases shareholder wealth. Under certain assumptions, one share/one vote best achieves this goal.

We distinguish between two classes of benefits from control: private benefits and security benefits. The private benefits of control refer to benefits the current management or the acquirer obtain for themselves, but which the target security holders do not obtain. These include synergy benefits realized by the acquirer, perquisites of control, and in extreme cases the diversion of resources from the security holders to subsidiaries of management or the acquiror. The security benefits refer to the total market value of the corporation's securities.

The assignment of income claims to voting rights determines the extent to which an acquirer must face competition from parties who value the firm for its security benefits rather than its private benefits. For example, in the absence of competition from another buyer with private benefits, a voting claim with no dividend rights will be tendered by a security holder to an acquirer at any positive price. The vote holder would fail to tender at such a price only if the acquirer faced competition, but the only potentially profitable source of competition for pure votes would come from another party with private benefits. In contrast, if dividend rights are tied to voting claims, some competition can come from parties with only security benefits of

control.

Through this competition effect, the allocation of voting rights influences whether control will rest in the hands of a high private benefit party or a high security benefit party, and it also determines the value of income claims under the management of the controlling party. These effects taken together represent the "allocative" role of the assignment of claims. The assignment of claims also determines the price that the acquirer must pay to vote holders for the private benefits of control, and this we call the "surplus-extraction" role.

## 1.2 STRUCTURE OF PAPER AND SUMMARY OF RESULTS

Section 2 presents the basic framework of an entrepreneur who desires to set up a corporation with a voting structure which maximizes the total market value of securities issued. The corporate charter specifies the share of dividends and the share of votes to which each security class has a claim. It also specifies the fraction of votes a party must acquire to effect a control change, which we denote by "alpha". The charter is set up with the expectation that the corporation's securities will become widely held, and in the belief that incumbent management cannot be relied upon to oversee future changes in control and in particular to fire itself if a superior management team becomes available (i.e. agency problems will exist). It is also supposed that incumbent management will receive the support of all small security holders.<sup>3/</sup> Thus  $\alpha = .5$  refers to the situation where there is majority rule and an acquirer must purchase 50% of the votes in order to take control.<sup>4/</sup>

Sections 3 and 4 consider a class of cases where a single buyer desiring control will appear with private and security benefit characteristics which are drawn randomly from a population which is known at the time the charter is

written. In order to focus on the allocative role of the voting structure, these sections assume that the buyer faces competition only from parties with no private benefit (we refer to these as arbitrageurs). Further, the parties who compete against the buyer cannot negotiate directly with him for a share of his private benefit. We establish that a one share/one vote security structure is optimal. It is also proved that, in the absence of resistance by the incumbent, it is optimal to set  $\alpha = 1$ , i.e., an acquirer should be required to purchase 100% of the company to get control.

Section 5 explores situations where the buyer faces resistance from a party representing incumbent management, who also derives private benefits from control. Under these conditions the "surplus-extraction" role of shares can be important. As a result it may be desirable to assign disproportionately low income claims to the votes, so as to encourage the incumbent to compete strongly for the votes in situations where he cannot compete strongly for the dividend claims because they are worth much more under the buyer's control. An extreme case of this is where votes are assigned no dividend rights. Then, if the buyer's private and security benefits are higher than the incumbent's, the buyer wins control, but he must do so by paying a higher price than under one share/one vote where the incumbent's competition against the buyer would be ineffective. If this were the only type of situation, the optimal charter would deviate from one share/one vote. Of course, the allocational role can conflict with the surplus-extraction role, since shifting dividend claims away from voting claims may cause a bidder with lower security benefits to win control.

Section 5 also explores the optimal voting rule. Once the resistance of the incumbent is taken into account it is no longer optimal to have a charter which requires that a bidder purchase 100% for control. In particular, setting  $\alpha$  above .5 makes it easier for the incumbent to use his private

benefit to resist the buyer than it is for the buyer to use his private benefit to gain from the acquisition. For example with  $\alpha = .9$ , the buyer must get just over 90% to achieve control. On the other hand, the incumbent, by purchasing 10% of the votes, can prevent the buyer from taking control. This makes it more likely that the incumbent can maintain control since he can afford to spend his private benefit concentrated on only 10% of the voting securities.

The tradeoffs discussed above are complicated, and do not lead to simple conclusions about security structure or voting rules. However, under the assumption that the buyer's private benefit is likely to be small relative to the incumbent's, we prove that one share/one vote and  $\alpha = .5$  (majority rule) is optimal. Further, if the buyer's private benefit is likely to be small (though not necessarily relative to the incumbent's), and the likelihood of both private benefits being simultaneously large can be ignored, then one share/one vote is optimal, though majority rule may not be (however,  $\alpha < 1$  is optimal).

Section 6 considers a different model of competition. In this model a party (the "arbitrageur") can purchase a block of shares which the buyer needs to attain control. The party then negotiates with the buyer and sells the block needed for control to the buyer in return for a share of the buyer's benefit from control. This model allows a broader understanding of the determinants of  $\alpha$ . In particular it is proved that it is optimal for the charter either (a) to make hostile acquisitions impossible (which corresponds to  $\alpha = 1$  in this section), or (b) to make  $\alpha$  a number between  $1/2$  and  $\bar{\alpha} < 1$ , where  $\bar{\alpha}$  depends on the ratio of the buyer's private benefit to the net social gain from a control change. Further in case (b)  $\alpha$  should be close to  $1/2$  when the buyer's private benefit is small.

### 1.3 EMPIRICAL EVIDENCE ON DEVIATIONS FROM ONE SHARE/ONE VOTE

Our theoretical results can be further clarified by reference to empirical evidence on deviations from one share/one vote. First, our model assumes that securities are widely held, and that the market for corporate control is the important factor in allocating control. We thus have nothing to say about the much more complicated specific control agreements which are used in closely held corporations.<sup>5/</sup> Second, since until very recently one share/one vote was a requirement for listing on the New York Stock Exchange, it is necessary to look elsewhere for widely held companies with different voting structures.

DeAngelo and DeAngelo (1985, p.39) identified 78 publicly traded companies on the American Stock Exchange and the Over the Counter Market (out of a universe of thousands of companies), which had classes of securities with differing voting rights. They found that where there was a deviation from one share/one vote, in a majority of cases it had the effect of giving the "incumbent" enough votes so that a change in control was impossible without his approval. That is, this is a situation corresponding to  $\alpha = 1$  in Section 6. In particular, the observed deviation from one share/one vote did not create a situation where widely held securities had differing effective voting rights; instead it created a situation where the incumbent had all the effective votes necessary to maintain control. In the model of Section 6 this can occur when the benefits of preventing value-decreasing hostile control changes outweigh the costs of preventing value-increasing control changes.

In Sections 5 and 6, we emphasize that when private benefits are small relative to security benefits, it will be the case that one share/one vote and  $\alpha < 1$  are optimal. Empirically, private benefits are, in most cases, forced to be small by the fiduciary responsibility of management, and by the minority shareholders' appraisal remedy.<sup>6/</sup> The former often prevents



management from extracting significant private benefits, and the latter can prevent an acquirer from doing the same thing.<sup>7/</sup> The DeAngelo and DeAngelo study suggests that when there is a deviation from  $\alpha < 1$  and one share/one vote, it is for the purpose of maintaining family control over an enterprise. Presumably in such cases the family receives significant private benefits from control.<sup>8/</sup> If the private benefits were small the family would find it in its interest to allow the market to determine control changes, and be rewarded for these benefits by a compensation agreement which paid it following a change in control. However, because the private benefits are large, the family prefers a charter which makes hostile bids impossible.<sup>9/</sup> We therefore believe that DeAngelo and DeAngelo's findings are consistent with our theoretical results about optimal security structure. That is, though deviations from one share/one vote occasionally occur, they do so in situations where our model suggests they should.

## 2. THE MODEL

We suppose the following stylized scenario. We imagine that the corporate charter creates various classes of shares, with possibly disproportionate voting rights. We assume that the charter is written by an entrepreneur who desires to maximize the total market value of securities issued. Since incumbent management cannot be relied upon to oversee future changes in control the charter builds in a process for replacing management; in particular, it specifies that a person who receives a fraction  $\alpha$  of all the corporation's votes in an election can replace existing management, where  $\frac{1}{2} \leq \alpha \leq 1$ .<sup>1/</sup> It further specifies a number of security classes,  $n$ , and the fraction of total votes  $v_i$ , and the share of dividends  $s_i$ , to which the  $i^{\text{th}}$  security class is entitled.<sup>2/</sup>

To simplify matters, we suppose that in the normal course of events each of the firm's securities is in the hands of a large number of small investors (i.e., the corporation is widely held), all of whom vote in favor of incumbent management. This situation changes on the occasion of a control contest. Then someone seeking control, whom we call the "buyer", and perhaps also a resisting group representing either management or an arbitrageur, may become large to influence a subsequent vote.

We assume that in order to become large, a party must make a public tender offer. The form of the bid we consider is an unconditional, restricted (i.e., partial) offer. That is, the bidder will offer to buy up to a fraction  $f_i$  of security  $i$  at a price of  $p_i$  per 100% of class  $i$ , and he will prorate equally if more than  $f_i$  is tendered. For example, if he makes an offer for 50 shares at a price of \$1 per share for a particular class and 100 shares are tendered from that class, then half of the shares tendered by each investor are returned, and the bidder pays out a total of \$50.

### Consequences of Control

Let  $y^I$  be the market value of the total income stream accruing to all the firm's security holders under the management of the incumbent, and let  $y^B$  be that value under the management of the buyer. We shall suppose that control can provide benefits to management over and above those received by the firm's security holders. The buyer's firm may obtain synergy benefits from running the corporation, and/or it may be able to freeze out minority shareholders at a value which is below  $y^B$ ; or the buyer might be a person who derives benefits from the perquisites associated with control. Let  $z^B$  denote the present value of the flow of private control benefits. Similarly, incumbent management may derive control benefits, which we denote by  $z^I$ .

At the time the corporate charter is written, the market recognizes that the incumbent's characteristics  $(y^I, z^I)$  cannot be known far into the future. The same is true of the characteristics of potential buyers  $(y^B, z^B)$ . The charter thus creates a mechanism which will be expected to work well in allocating control, averaging over the future random occurrences of  $(y^I, z^I)$  and  $(y^B, z^B)$ . We focus on how the assignment of voting rights in the charter affects the allocation of management and shareholder benefits due to control changes.<sup>3/</sup>

In the scenario described above, the assignment of voting rights affects shareholder welfare by influencing the price which must be paid for control. The reason is that the price a buyer must pay for votes will depend on the value of the votes to others, which in turn is affected by the share of firm income tied to the votes. Thus, the assignment of votes to shares will influence the degree of competition in the market for control. We develop this point below, starting from the simplest case of no competition.

### 3. NO COMPETITION - THE CASE OF A SINGLE BUYER

Assume that a bidder of type  $(y^B, z^B)$  contemplates taking control of the target, and there is no other party who can make a tender offer. First, consider the case where there is one share/one vote and only one class of securities, i.e.  $s_1 = v_1 = 1$ , and a control shift requires a majority of the votes, i.e.  $\alpha = .5$ . Consider an extreme situation where  $y^I = 100$ ,  $z^I = 0$ ,  $y^B = 3$ ,  $z^B = 1$ , i.e., under incumbent management the firm is worth 100, while under control of the buyer the firm's shares would be worth 3. Clearly, the shareholders do not want this buyer to get control and indeed there is good reason to believe that he won't under one share/one vote. In particular, the most that the buyer is willing to pay for the 50% required to obtain control is  $\frac{1}{2}y^B + z^B = 2.5$ , composed of a value of  $\frac{1}{2}y^B = 1.5$  from the shares purchased plus  $z^B = 1$  which is the private benefit from control. However, this translates into a price of 5 per 100%, and at this price B's tender offer could fail. This is because the shares under the incumbent are worth 100, and so any shareholder who thinks that the bid will fail does not tender his shares, correctly forecasting that he will obtain 100 rather than the 5 offered by the buyer.<sup>4/</sup>

Next, contrast the above outcome with what would occur if the charter had two classes of shares. Let class 1 have all of the votes and 1% of the income claims, while class 2 has no voting rights and 99% of the income claims, i.e.,  $s_1 = .01$ ,  $v_1 = 1$ ,  $s_2 = .99$ ,  $v_2 = 0$ . Now the market values of the income from the securities under the incumbent are  $s_1 y^I = 1$  for class 1, and  $s_2 y^I = 99$  for class 2. The value of class 1 under the buyer is  $s_1 y^B = .03$ . Let the buyer make an offer for all of class 1 at a price per 100% of 1.01. Each shareholder of class 1 will tender his shares since 1.01 is larger than the value of holding shares under either the incumbent or the buyer. Hence, this bid is successful. Moreover, since the bid yields the buyer a

total benefit of 1.03 (composed of  $z^B = 1$  plus the income from the class 1 shares of .03), which exceeds the cost of the bid, 1.01, this is a profitable takeover bid. (It is not the most profitable takeover bid, however. We shall see in the next section that B can increase his profit by making a restricted offer for 50% of the voting shares.)

The point is that creating a class of shares with disproportionately high voting rights lowers the cost of obtaining control. The reason is that while the security income benefits to the buyer of obtaining control are reduced, the private benefits are not. Shareholders are implicitly competing against the buyer by being unwilling to part with their votes unless they are compensated for the dividend claims that are associated with the votes. However, since the buyer receives a private benefit from control, he is willing to pay more per vote than a vote is worth to a single shareholder.

These ideas can be clarified and developed further by strengthening the definition of shareholder competition to include the possibility that a shareholder can become an arbitrageur and explicitly make a counter bid to block the buyer. This is the topic of the next section.<sup>5/</sup>

#### 4. COMPETITION FROM AN ARBITRAGEUR

We suppose that the arbitrageur, A, is someone with a very small initial holding of some security  $i$  in the company, and so has an interest in ensuring that this security's value is preserved. However, the arbitrageur is supposed to get no other private benefit from maintaining the status quo, i.e.  $z^A = 0$ . Hence we assume that A only enters the competition if he can defeat the buyer B without making losses on the shares he purchases. We shall also suppose that each security  $i = 1, \dots, n$  includes among its investors someone who will act as an arbitrageur to defend that security's value; we use A to refer to a general arbitrageur.

We now require that the buyer's bid be such that it deters entry by any arbitrageur. The buyer's offer specifies the price per share  $p_i^B$  and the fraction he is willing to accept  $f_i^B$  for each security class  $i$ .

Obviously deterrence by A is an issue only if B's bid would succeed in the absence of any opposition. The condition for this is

$$(4.1) \quad \sum f_i^B v_i \geq \alpha,$$

where the summation is over all security classes  $i$  with  $p_i^B \geq s_i y^B$ . The point is that, if  $p_i^B < s_i y^B$ , no (negligible) class  $i$  shareholder who expects B to win will tender, since he will reason that he can obtain  $s_i y^B$  by holding on to his shares.<sup>6/</sup>

Definition. Let B make a bid  $b^B = (p_1^B, \dots, p_n^B; f_1^B, \dots, f_n^B)$  which satisfies (4.1). We say that this deters A if, either

$$(4.2) \text{ For all } i, \text{ if } s_i y^B > p_i^B, \text{ then } s_i y_B \geq s_i y^I, \text{ and if } s_i y^B \leq p_i^B, \text{ then } f_i^B p_i^B + (1-f_i^B) s_i y^B \geq s_i y^I; \text{ or}$$

(4.3) there does not exist a counter bid  $b^A$  by A, such that in the resulting contest between  $b^B$  and  $b^A$  there is an equilibrium where A wins and does not lose money on securities purchased.

(4.2) states that the buyer's offer raises (or keeps the same) the value of each security class, in which case A has no incentive to block B since he benefits from the bid. (Note that we ignore the possibility that A acquires a large voting block with the intention of negotiating later with B over a transfer of control; this is the focus of Section 6, however.) If  $p_i^B < s_i y^B$ ,

no class  $i$  holder, expecting  $B$  to win, tenders his shares and so the market value is  $s_i y^B$ . On the other hand, if  $p_i^B \geq s_i y^B$ , all class  $i$  holders, expecting  $B$  to win, tender their shares, which are prorated so that a fraction  $f_i^B$  are accepted and a fraction  $(1-f_i^B)$  are returned (the latter having value  $s_i y^B$ ). Thus  $f_i^B p_i^B + (1-f_i^B) s_i y^B$  is the post announcement price in this case.

(4.3) says that, while  $A$  might like to block  $B$ , doing so is too costly. The condition refers to an equilibrium when there are competing bids. The basic idea behind this equilibrium is that security holders have rational expectations about the outcome of the contest and tender to the bidder who offers the highest rate of return, where account is taken of other people's tender decisions and hence of the take-up rate on tendered securities. It is supposed that  $y^B, z^B, y^I, z^I$  are common knowledge at the time of the contest (any uncertainty about these variables has been resolved by then). It is also assumed that each security holder is negligible in the sense that he ignores his influence on the outcome of the contest. A formal definition of this equilibrium is deferred to the Appendix; however, we shall give an informal discussion as we proceed, which should be sufficient for an appreciation of (4.3).<sup>7/</sup>

The following Lemma, proved in the Appendix, is useful.

Lemma 1: Given competing offers by two parties the equilibrium profit which either party can make from its offer is no larger than the private benefit it receives from running the company; no offeror makes profit from the price appreciation of the shares he purchases.

This is a variant of the free-rider problem discussed in Grossman-Hart (1980): a winning bid must be at a sufficiently high price that no shareholder, and thus no bidder, can expect shares to appreciate in value after the offer is consummated.

In order to analyze the effects of arbitrage resistance, consider first the case where  $y^B \geq y^I$ , i.e. control by B would be value-increasing for security holders. Then (4.2) is automatically satisfied, and so A will not block any bid by B. One winning bid that B could make is an unrestricted offer for each security  $i$  at price  $s_i y^B$  per 100%. It is then an equilibrium for everyone to tender to B (security holders are indifferent between tendering and holding on; however B could always offer slightly more than  $s_i y^B$  to ensure that they tender). B's profit will be  $z^B$ , and so we know from Lemma 1 that there is no way of getting control for B which is more profitable.<sup>8/</sup> The total return to security holders in this event will be  $y^B$ .

The case where  $y^B < y^I$  is more complicated and it is useful to consider first some examples. Suppose  $y^I = 100$ ,  $y^B = 80$  and there is one share/one vote and majority rule ( $\alpha = .5$ ). Suppose first that B tried to get control as above by making an unrestricted offer for the shares at  $y^B = 80$  (or just above). Without opposition by A, there is again an equilibrium in which B is expected to win, everybody tenders to B, and B does win. This is the equilibrium described in footnote 4 of Section 3. (There is also an equilibrium in which B is expected to lose, nobody tenders and B loses.) Now, however, shareholder return will fall from 100 to 80, and so A has an incentive to block this bid. In fact he can do so costlessly by making his own unrestricted offer at 100. With these two offers on the table, the only equilibrium is where A wins; for if B is expected to win, tendering to A dominates either tendering to B or holding on (which yields 80); this means that A will get all the votes and so B cannot win.<sup>9/</sup>

How can B win in this case? One possibility is for B to make an unrestricted offer at 100. A has no interest in blocking this since he does not face a capital loss if B gets control. Such a strategy is, however, very expensive for B. If B is expected to win, everybody will tender to B (since



holding on yields 80), which means that B incurs a loss of  $100 - 80 = 20$  from the tender offer.

There is a cheaper strategy for B to adopt: B can make a restricted offer at just above 100 for 50% of the shares. B still makes a capital loss on this offer, but it is reduced to  $\frac{1}{2} (100-80) = 10$ . Note that this offer, if unopposed, causes the value of the firm to fall from 100 to  $\frac{1}{2} (100) + \frac{1}{2} (80) = 90$  since all shares will be tendered to B, B will pay 100 on half of them and the remainder, which are returned, will be worth 80. A would therefore like to block this offer, but the problem is that the most he is prepared to offer for the shares is 100 per 100% (since he gets no private benefit from control). If A counters with this bid, however, he will lose. The point is that shareholders will want to tender their shares to both A and B, but it cannot be a rational expectations equilibrium for A to get more than 50%; the reason is that if a shareholder expected B to get less than 50%, he would anticipate no prorationing of his shares by B, and he (and all other shareholders) would tender to B to get a price above 100 instead of 100 from A.<sup>10/</sup>

So B can get control with the restricted offer described above. In fact Proposition 1 below shows that this is the cheapest way for B to get control. Of course, given B's capital loss on the shares purchased, he will only make this bid if his private benefit  $z^B > 10$ .

It is useful to contrast the above outcome with what would happen if there were two classes of shares. Suppose each class has 50% of the income claims, but only class 1 has votes (i.e.  $s_1 = s_2 = \frac{1}{2}$ ,  $v_1 = 1$ ,  $v_2 = 0$ ). Similar arguments to the above show that the cheapest way for B to get control is to make a restricted offer for 50% of the class 1 shares at a price equal to  $s_1 y^I = .5(100)$  per 100% (see Proposition 1 below). B continues to make a

capital loss, but this is reduced to .5 ( $.5(100) - .5(80)$ ) = 5 since B only has to buy up 25% of the total profit stream. Hence B will win control more often than under one share/one vote; in fact whenever  $z^B > 5$ . Also in the events where B does win control, the market value of the firm is  $.5(.5(100)) + (1-.5(.5(80))) = 85$ , which is lower than the value of 90 under one share/one vote (again because B has to buy up only 25% of the profit stream at 100). We see then that dual class stock has two disadvantages relative to one share/one vote: it more readily attracts inferior buyers (those with  $y^B < y^I$ ); and an inferior buyer causes a greater decline in market value.

Let us now return to the general case  $y^B < y^I$  and an arbitrary security structure. As in the above example, one way for B to get control is to make an unrestricted offer at  $s_i y^I$  for each security  $i$  (A has no interest in blocking this). This costs B:  $y^I - y^B$ . Again, however, there are cheaper strategies for B to adopt (if  $\alpha < 1$ ). The following lemmas, established in the Appendix, are useful.

Lemma 2: No deterring bid by B that increases or keeps the same each security's value (i.e., where (4.2) holds) is cheaper than an unrestricted offer at  $s_i y^I$  for each security  $i$ .

So, a cheaper strategy for B must reduce the price of some security, but deter A via condition (4.3).

Lemma 3: The most effective form of resistance by A is to make an unrestricted offer at  $s_i y^I$  for all  $i$ . Hence, to deter A, B's bid must win against this offer. That is, if  $y^B < y^I$ , a necessary and sufficient condition for the buyer's bid to satisfy (4.3) is that in a contest matching this bid with the unrestricted bid  $\bar{b}^A = (s_1 y^I, \dots, s_n y^I; 1, \dots, 1)$  by A, every

equilibrium has enough securities tendered to B so that he wins (i.e., has at least  $\alpha$  votes).

In the Appendix, we use these results to prove:

Proposition 1: If  $y^B < y^I$ , then the cheapest way for B to get control is by making a restricted offer at a price just above  $s_i y^I$  for each security  $i$ . The fractions asked for each of the securities,  $f_i^*$ , are chosen to minimize the total share of the firm's profit stream,  $S^*$ , that B must take up given that he must accumulate a fraction  $\alpha$  of the corporation's votes. That is  $(f_1^*, f_2^*,$

...,  $f_n^*)$  minimizes  $\sum_{i=1}^n f_i s_i$  subject to  $\sum_{i=1}^n f_i v_i \geq \alpha$ .

We may apply Proposition 1 to the two examples considered above. Under one share/one vote,  $s_1 = v_1 = 1$  and so  $S^* = f_1^* = \alpha$ , which equals .5 under majority rule. On the other hand, given voting and nonvoting shares with equal income claims ( $s_1 = s_2 = .5$ ,  $v_1 = 1$ ,  $v_2 = 0$ ),  $f_1^* = \alpha$ ,  $f_2^* = 0$  and so  $S^* = (\alpha/2)$ , which equals .25 under majority rule.

Proposition 1 tells us that if  $y^B < y^I$ , the cost to B of getting control (net of the market value of the income stream purchased) is  $S^*(y^I - y^B)$  and so B will only take control if

$$(4.5) \quad S^*(y^I - y^B) < z^B.$$

In this event, security holders will be presented with the offer  $p_i = s_i y^I$  (plus a penny),  $f_i = f_i^*$  for each  $i$ , all will tender, and the take-up rate will be  $f_i^*$ . The total value of security  $i$  is then

$$f_i^* s_i y^I + (1-f_i^*) s_i y^B,$$

and the total value of the firm is

$$\sum_{i=1}^n (f_i^* s_i y^I + (1-f_i^*) s_i y^B) \equiv S^* y^I + (1-S^*) y^B.$$

We may summarize our results so far as follows:

Proposition 2. In the case of arbitrage resistance, if:

- (a)  $y^B \geq y^I$  then B gets control and security holders receive  $y^B$ ;
- (b)  $y^B < y^I$  and  $S^*(y^I - y^B) < z^B$  then B gets control and security holders receive  $S^* y^I + (1-S^*) y^B$ ;
- (c)  $y^B < y^I$  and  $S^*(y^I - y^B) \geq z^B$  then B does not get control and security holders receive  $y^I$ .

Thus, the total return (i.e., the market value of all the firm's securities) in the event that the incumbent and buyer characteristics are given by  $(y^I, y^B, z^B)$  is:

$$(4.6) \quad R^*(y^I, y^B, z^B) = \begin{cases} y^B & \text{if } y^B \geq y^I \\ S^* y^I + (1-S^*) y^B & \text{if } y^B < y^I \text{ and } S^*(y^I - y^B) < z^B \\ y^I & \text{if } y^B < y^I \text{ and } S^*(y^I - y^B) \geq z^B \end{cases}$$

Note that if  $y^B < y^I$  and control shifts to B, shareholders suffer from a bid (since  $S^* y^I + (1-S^*) y^B < y^I$ ). This is in spite of the fact that for all securities the bid price exceeds  $s_i y^I$ .

It is clear from Proposition 2 that shareholder return is determined by  $S^*$ . Furthermore, increases in  $S^*$  are good for shareholders since they make it less likely that an inferior buyer wins control ( $S^*(y^I - y^B) < z^B$  will be

satisfied by fewer  $z^B$ 's) and they reduce the loss to shareholders in the event that this happens ( $S^* y^I + (1-S^*)y^B$  is increasing in  $S^*$ ). We saw an illustration of this above where one share/one vote yielded a higher value of  $S^*$  than dual class shares and therefore protected shareholder value better. Proposition 3 below shows that this conclusion generalizes: one share/one vote protects shareholder value better than any other security structure. The proposition follows directly from the following Lemma, which is proved in the Appendix.

Lemma 4.  $S^* \leq \alpha$  with equality if and only if there is one share/one vote (i.e.  $(s_1/v_1) = \dots = (s_n/v_n)$ ).

Lemma 4 says that any departure from one share/one vote allows a fraction  $\alpha$  of the votes to be obtained with a purchase of less than a fraction  $\alpha$  of profits. The reason is that if some votes have disproportionately large profit claims assigned to them, others must have disproportionately small ones, and the latter can always be purchased first.

Proposition 3: Suppose a voting rule  $\alpha$  is given. Then the total market value of the firm's securities (as given in (4.6)) will be higher under one share/one vote than under any other security structure.

The intuition behind Proposition 3 is that tying shares to votes intensifies the competition from the arbitrageurs against the buyer. Since votes are valuable for the private benefit of control, while dividend shares are valuable to those seeking to raise market value, the tie-in raises the value of the votes to an arbitrageur and hence causes him to bid more aggressively against the buyer: this leads the buyer to pay more for the

votes. As a result, buyers who will tend to lower the market value of the firm, and are attempting to purchase the firm for their own (private) benefit, are more likely to be screened out.

Since most tender offers are not restricted, and since value-reducing tender offers are virtually nonexistent (see, e.g. SEC (1985)), some further comments on the role of such offers are necessary.

Note that a bidder for whom  $y^B < y^I$  can succeed in making a value-reducing offer because he can offer a premium for only 50% of the shares, and in effect give less than the status quo to the other 50%. If he had to pay the same price for all 100% of the shares, then a successful value-reducing offer would be impossible. In particular, if B is a corporation that desires to merge with the target after purchasing 51%, then it would have to pay a "fair value" for the other 49%. Even though the actual market value of the income stream is  $y^B$ , the minority shareholders of the target could demand an appraisal and argue to a court that (a) the best estimate of the worth of the company is the price paid for the other 51% of the shares by B, or (b) that the firm was really worth  $y^I$  prior to the offer and that is what they are entitled to <sup>11/</sup>

The buyer could avoid all of these difficulties by not merging with the target, but still maintaining voting control. A problem with this approach is that the extraction of the private benefit  $z^B$  from the target firm could create conflict of interest litigation from the minority shareholders of the target. Note, however, that if  $z^B$  is not so large as to make a conflict of interest undeniable, then a partial offer for 50% which reduces shareholder value is feasible when  $y^B < y^I$ . It is difficult to know how the courts will deal with these issues in the abstract, since no actual court case will have all parties agreeing on the values of  $y^I$ ,  $y^B$ , and  $z^B$ . In any event, even if we assume partial offers for a share class are not feasible, it will still be

the case that our propositions on the optimality of one share/one vote hold true.

Finally, in the model of this Section, it is assumed that no party tries to deter takeovers which are value-increasing. For this reason, the security holders can only benefit from requiring that  $\alpha = 1$  for a control change (by Lemma 4,  $S^*$  achieves a maximum of 1 under one share/one vote and  $\alpha = 1$ ). Setting  $\alpha = 1$  deters a value-decreasing bidder since he can no longer profitably use a restricted offer at a premium to get control. The Appendix proves an even stronger result:

Proposition 4: A corporate charter with one share/one vote and  $\alpha = 1$  gives security holders a higher total market value than any other security structure and any other  $\alpha$ .

Clearly, the problem with requiring a buyer to get all of the firm's votes for control is that it can then be very easy for incumbent management, or some group who wants to free ride on the improvement, to buy a small fraction of the firm and block the bid. These points are taken up in the following sections.

## 5. RESISTANCE BY INCUMBENT MANAGEMENT

In the last section, we gave some arguments in favor of the one share/one vote rule. The same arguments, however, led to the conclusion that corporate charters should require a bidder to get 100% of the corporation's votes to acquire control. Since such extreme voting rules are not observed in practice, we consider in this and the next section how our analysis can be modified to explain values of  $\alpha$  less than one.

It seems plausible that the main disadvantage of a 100% rule (or something close to it) is that it would make it too easy for a value-increasing control bid to be blocked. We analyze this in two ways. In this section, we explore the implications of managerial resistance -- as opposed to arbitrageur resistance -- to a bid. In the next section we return to arbitrageur resistance but allow the arbitrageur to block a bid with the intention of negotiating later with the bidder for a share of the acquisition gains.

We start with the case of managerial resistance. (For simplicity we now ignore any other forms of resistance, e.g. by arbitrageurs.) Suppose B makes a bid  $b^B$ . Then in principle, incumbent management I is willing to make a counterbid  $b^I$  as long as I wins the resulting contest and the private benefit from maintaining control  $z^I$  is no smaller than the net cost of the counterbid. (We assume that I would lose his private benefit if B takes control.) The incumbent may finance the counterbid out of his own resources (e.g., a leveraged buyout) or he may find a "friendly" firm to which the private benefit  $z^I$  can be transferred and who will make the counteroffer (i.e., a "white knight"). We assume, however, that the corporate charter prevents I's use of the corporation's assets for the purpose of maintaining  $z^I$ .<sup>12/</sup>

This leads to the following:



Definition. Let B make a bid  $b^B$ . We say that this deters I if

- (5.1) there does not exist a counterbid  $b^I$  by I, such that in the resulting contest between  $b^B$  and  $b^I$ , there is an equilibrium where I wins and does not make a net loss.

The notion of deterrence is almost the same as for the case of an arbitrageur (see (4.3)). One difference is that I resists even if B's bid raises security prices.

It follows from Lemma 1 that it never pays B to make a bid which attracts a counterbid from I (since neither B nor I can make money from a losing offer). Out of all the bids that deter I, let  $\hat{b}^B = (\hat{p}_1^B, \dots, \hat{p}_n^B, \hat{f}_1^B, \dots, \hat{f}_n^B)$  maximize B's net profit. Then B will make a bid and gain control whenever this maximized profit is nonnegative, and in this event the total return to security holders is

$$(5.2) \quad \sum_{i=1}^n \{ \text{Max} (s_i y^B, \hat{f}_i^B \hat{p}_i^B + (1 - \hat{f}_i^B) s_i y^B) \} \quad .^{13/}$$

On the other hand, if B doesn't take control, total return to security holders is  $y^I$ .

It is fairly clear why in this framework  $\alpha$  close to 1 will not generally be optimal. Under these conditions, management need accumulate only a small number of votes to block a bid. Given a positive private benefit  $z^I$  of retaining control, management is therefore prepared to pay a high price for each of these votes, which makes it easy to outbid B. For example, under one share/one vote, if  $y^B = 55$ ,  $z^B = 9$ ,  $y^I = 50$  and  $z^I = 2$ , then the highest price per share that B can pay for 100 $\alpha$ % is  $p_B y^B + z^B/\alpha$  while the highest price that I is willing to pay for 100 (1- $\alpha$ )% is  $p_I = y^I + z^I/(1-\alpha)$ . Thus, if the

charter specified that B must get 90% to obtain control, then  $p_B = 65$ , and  $p_I = 70$ . Therefore, I can prevent B's value-increasing bid from succeeding. On the other hand, if  $\alpha = .5$ ,  $p_B = 73$  and  $p_I = 54$  so B would succeed against I, and this is good for shareholders.

What drives the above example is that a rise in  $\alpha$  puts relatively more weight on the incumbent's private benefit than on the buyer's. This focuses the competition for control on the size of the buyer's private benefit relative to that of the incumbent, rather than on size of the buyer's security value relative to that of the incumbent.

In the above example, it is harmful to shareholders to put more weight on I's private benefit since this deters a value-increasing offer. However, sometimes I's private benefit can be used to increase competition for control in a way that is in the shareholders' interest. In particular, a charter which departs from one share/one vote may increase competition between the two parties and give shareholders a larger share of the total surplus. We illustrate this with an example.

Let  $y^B = 100$ ,  $z^B = 1.1$ ,  $y^I = 10$ , and  $z^I = 1$ . This is a case where the buyer will improve the target. With one share/one vote and  $\alpha = \frac{1}{2}$ , B will offer to purchase all the shares at a price of 100. The incumbent cannot resist this offer, since there is no way that he can tender for 50% of the shares at a price anywhere near 100 and avoid substantial losses. Hence, under one share/one vote, shareholders receive 100 for 100% of the corporation. Now suppose that the charter specified two classes of securities: security 1 has all the votes and none of the dividends ( $s_1 = 0$ ,  $v_1 = 1$ ) while security 2 has all of the dividends and none of the votes ( $s_2 = 1$ ,  $v_2 = 0$ ). In order to deter I, the buyer must make an offer for 50% of the votes (i.e., class 1) at a price per vote of just above 2. (An offer by B for class 1 at a price of less than 2 will permit I to make a counteroffer for 50%

at 2 which will defeat B and leave I with no net losses.) Thus class 1 security holders receive a total of  $(.5)(2) = 1$ , while class 2 holders have securities which are worth 100 under the control of B. Therefore, security holders receive a total of 101 under a charter with voting and nonvoting shares. For the chosen values of  $(y^B, z^B, y^I, z^I)$  this is better for security holders than is one share/one vote.

The intuition underlying this example is the following. Both one share/one vote and pure votes ensure that B gets control. Under one share/one vote, however, the shareholders extract none of B's private benefit. The reason is that in the competition over bundles of "public" benefit  $y$  and private benefit  $z$ , B is sufficiently dominant relative to I that B can win by paying only  $y^B$ ; which is what shareholders get by free-riding anyway. In contrast, under a pure votes system, the competition takes place over the pure private benefit, and, since  $z^B$  and  $z^I$  are close, this leads to the extraction of a large fraction of B's surplus.

To put it very simply, shareholders benefit when B and I compete over products for which they have similar willingnesses to pay; in this example, pure votes qualify better for this than shares and votes together.<sup>14/</sup>

The above example shows that when both parties have private benefits, departures from one share/one vote can raise a firm's market value by allowing shareholders to extract a greater fraction of these benefits. This surplus-extraction effect will only be important, however, when  $z^B$  and  $z^I$  are both large. In situations where only one of them is significant, factors similar to the ones analyzed in Section 4 will be relevant in determining optimal financial structure.

To see this it is convenient to divide up the possible values of private benefits into the following four categories, which are assumed to be mutually exclusive and exhaustive.

- Case 1:  $z^B = \bar{z}^B > 0, z^I = 0$  (B's private benefit "large", I's "small")  
 Case 2:  $z^B = 0, z^I = \bar{z}^I$  (B's private benefit "small", I's "large")  
 Case 3:  $z^B = z^I = 0$  (both private benefits "small")  
 Case 4:  $z^B = \bar{z}^B > 0, z^I = \bar{z}^I > 0$  (both private benefits "large")

Here "large and "small" mean relative to the security benefits,  $y^B$  and  $y^I$ .

Let us analyze each of these possibilities in turn. Case 1 is just like the situation studied in Section 4 since the resisting party's private benefit is zero. The outcome for this case is therefore summarized by Proposition 2 and (4.6).<sup>15/</sup> In particular, one share/one vote is good because it minimizes the chance of an inferior buyer getting control and the loss to shareholders in the event that this does happen.

Case 2 is the mirror-image of Case 1 in which I's private benefit is significant, while B's is not. It is easy to extend the logic of Section 4 to show that:

- (A) Since  $z^B = 0$ , the most effective bid by B is an unrestricted offer at  $s_i y^B$  for all  $i$  (cf. Lemma 3).  
 (B) If  $y^B > y^I$ , the cheapest way for I to resist this bid is to make a restricted offer for a fraction  $\hat{f}_i$  of security  $i$  at a price  $s_i y^B$ , where  $\hat{f}_1, \dots, \hat{f}_n$  minimize the total share of the firm's profit stream,  $\hat{S}$ , that I must take up given that he must accumulate a fraction  $(1-\alpha)$  of the corporation's votes to block B; i.e.  $(\hat{f}_1, \dots, \hat{f}_n)$  minimizes
- $$\sum_{i=1}^n \hat{f}_i s_i \text{ subject to } \sum_{i=1}^n \hat{f}_i v_i \geq (1-\alpha). \quad (\text{cf. Proposition 1}).$$
- Such a bid costs I  $\hat{S}(y^B - y^I)$  and so I will only make it if  $\hat{S}(y^B - y^I) \leq z^I$ .

(C) If  $y^B \leq y^I$ , B cannot win control since I can defeat him costlessly with an unrestricted offer at  $s_i y^I$  for each  $i$ .

From (A)-(C) it follows that:

(5.1) In Case 2, B gets control if  $y^B > y^I$  and  $\hat{S}(y^B - y^I) > z^I$ ; otherwise I retains control. If B gets control, shareholder return is  $y^B$ . If I retains control, shareholder return is  $y^I$ .<sup>16/</sup>

(5.1) tells us that in Case 2 the corporation's security structure affects shareholder return only through  $\hat{S}$ . Clearly, increases in  $\hat{S}$  are good for shareholders since they make it more likely that a superior buyer (one with  $y^B > y^I$ ) gets control (the inequality  $\hat{S}(y^B - y^I) > z^I$  is more likely to be satisfied when  $\hat{S}$  is large). The following lemma (which is a restatement of Lemma 4) says that out of all possible security structures one share/one vote yields the highest possible value of  $\hat{S}$ .

Lemma 5.  $\hat{S} \leq (1-\alpha)$  with equality if and only if there is one share/one vote (i.e.  $(s_1/v_1) = \dots = (s_n/v_n)$ ).

It follows from Lemma 5 that one share/one vote is better than all other security structures in Case 2 since it maximizes the probability of a superior buyer winning control. The intuition is as in Section 4: tying votes to shares increases the competition from the buyer against the incumbent.<sup>17/</sup>

An example may be useful here. Suppose there is one share/one vote and majority rule, and  $y^I = 80$ ,  $y^B = 100$ . Then (A) tells us that the most effective way for B to get control is by making an unrestricted offer at 100. By (B), I's best response to this is a restricted offer for 50% of the shares

at 100 (or just above). Such an offer will bring I victory, but at a capital loss of  $\frac{1}{2}(100-80)$ . Hence, I will only be prepared to resist if  $z^I \geq 10$ .

Contrast this with what would happen with two classes of shares. Let class 1 have all the votes and 50% of the income claims, while class 2 has 50% of the income claims but no voting rights. Then to get control B will make an unrestricted offer for the class 1 shares at  $\frac{1}{2}(100) = 50$ , while I's best response is a restricted offer for 50% of these shares at 50. I's capital loss is reduced to  $\frac{1}{2}(50 - 40) = 5$  since he needs to buy up only 25% of the firm's profit and so I will retain control as long as  $z^I > 5$ . This confirms the idea that a departure from one share/one vote will increase the probability of an inferior incumbent retaining control.

We turn now to the remaining cases, 3 and 4. Case 3 is in fact trivial since, in the absence of private benefits, control goes to the party with the highest market value. That is, if  $y^B > y^I$ , B wins control with an unrestricted offer at  $s_i y^B$  for all  $i$  (and I cannot afford to resist); while if  $y^B < y^I$ , I can defeat this offer with an unrestricted offer at  $s_i y^I$  and so retains control.<sup>18/</sup> It follows that in Case 3 security structure is irrelevant. On the other hand, in Case 4 we have seen that one share/one vote may not be optimal.

The results for Cases 1-3 can be summarized as follows:

Summary. With managerial resistance:

- (1) In Case 1: B gets control if (a)  $y^B \geq y^I$ , or (b)  $y^B < y^I$  and  $S*(y^I - y^B) < z^B$ ; otherwise I retains control. Under (a), shareholder return is  $y^B$ ; under (b) it is  $S*y^I + (1-S)*y^B$ ; if I retains control, it is  $y^I$ .

- (2) In Case 2: B gets control if  $y^B > y^I$  and  $\hat{S}(y^B - y^I) > z^I$ ; otherwise I retains control. If B gets control, shareholder return is  $y^B$ . If I retains control, shareholder return is  $y^I$ .
- (3) In Case 3: B gets control if  $y^B > y^I$ , while I retains control if  $y^B \leq y^I$ . For a particular realization  $(y^I, y^B)$ , shareholder return is the larger of  $y^I$  and  $y^B$ .

Evidently, if Cases 1-3 were the only ones ever to occur, one share/one vote would be optimal. Shareholders like high values of  $S^*$  (in Case 1) and  $\hat{S}$  (in Case 2) since this makes it more difficult for an "undesirable" party to take or remain in control. Under one share/one vote,  $S^* = \alpha$  and  $\hat{S} = (1-\alpha)$  where  $\alpha$  is the plurality, and so the feasible set is  $S^* + \hat{S} = 1$ . Under any other security structure, however,  $S^* + \hat{S} < 1$  (by Lemmas 4 and 5) and so the feasible set is strictly inferior; in particular any feasible  $(S^*, \hat{S})$  can be dominated by one from the one share/one vote feasible set. In Case 4, however, one share/one vote may not maximize market value and so if this case occurs sufficiently often relative to the others, the optimal charter may depart from one share/one vote.

How important is the surplus-extraction effect in Case 4 likely to be empirically? While it is possible that it can sometimes explain observed departures from one share/one vote, our feeling is that in a large class of cases it is likely to be swamped by the other two effects. As support for this position, note that while the private benefits  $z^B, z^I$  may sometimes be large (relative to  $y^B, y^I$ ), legal doctrines of "fiduciary responsibility" and "fairness" will prevent them from being large very frequently. In particular, unless the corporate charter explicitly permits the majority to derive significant benefits from control (via the types of dilution discussed in Grossman-Hart [1980]), minority shareholders can assert and perfect claims

against the private benefits enjoyed by the majority. Of course, the courts cannot always be relied upon to ensure that the majority and minority enjoy equal treatment, so the entrepreneur in writing a charter must take into account the possibility that  $z^B$  will sometimes be large.

Suppose that for the above reasons  $z^B$  will be small with high probability. Then Cases 1 and 4 will be very infrequent relative to Cases 2 and 3, and so the reason for deviating from one share/one vote will be absent. Further, it is never desirable to raise  $\alpha$  above  $\frac{1}{2}$  since this makes it easier for the incumbent to resist a value increasing offer. (To put it another way, the optimal value of  $\alpha$  in Case 2 is  $\alpha = \frac{1}{2}$ .) Hence the Appendix establishes:

Proposition 5: If the probability that  $z^I > 0$  is bounded away from zero, and the probability that  $z^B > 0$  is sufficiently small, then  $\alpha = \frac{1}{2}$  and one share/one vote yield a strictly higher expected security return than any other security structure and  $\hat{\alpha}$ .

In our model, the incumbent resists B's offer by (directly or indirectly) becoming a large shareholder. As a large shareholder, he may not be able to use the "business judgment" rule to resist suits demanding that he return the private benefit  $z^I$  to security holders. In such cases the  $z^I$  which is relevant for managerial resistance may be small in similar situations to those in which  $z^B$  is small; in particular, the probability that  $z^I$  is significant may be small. We can still prove the optimality of one share/one vote in such circumstances as long as the probability that  $z^B$  and  $z^I$  are simultaneously large is negligible (this means that Case 4 can be ignored). However, majority rule need no longer be optimal.



Proposition 6: Assume that there is a positive probability that  $y^I < y^B + z^B$  given that  $z^I = 0$ ,  $z^B = \bar{z}^B$  and  $y^B < y^I$ . Assume that the probability of the events in Case 4 is negligible relative to the probability of the events in Cases 1 and 2. Then: given any security structure  $(s_1, \dots, s_n; v_1, \dots, v_n)$  with  $s_i/v_i \neq 1$  for all  $i$ , and a plurality  $\alpha$ ,  $\frac{1}{2} \leq \alpha \leq 1$ , one share/one vote and the plurality  $\alpha$  yield a strictly higher expected return.

A situation where the conditions of Proposition 6 are satisfied is if  $z^B$ ,  $z^I$ ,  $y^B$ ,  $y^I$  are mutually independent random variables and  $\text{Prob}[z^B = \bar{z}^I] = \text{Prob}[z^B = \bar{z}^B] = t$ , where  $t$  is small. However, more general cases where large  $z$ 's tend to imply low  $y$ 's (because a lot of profit is being siphoned off) are consistent with the proposition.

Proposition 6 demonstrates the desirability of the one share/one vote rule for some plurality  $\alpha$ . However, it does not tell us anything about the magnitude of  $\alpha$ . Increases in  $\alpha$  raise shareholder return in Case 1 by reducing the likelihood, and mitigating the consequences, of value-decreasing bids; while decreases in  $\alpha$  raise shareholder return in Case 2 by reducing the likelihood that an inefficient incumbent remains in place. The optimal value of  $\alpha$ , denoted by  $\alpha^*$ , will be determined by which of these two effects is more important; this in turn depends on the joint probability distribution of  $y^I$ ,  $y^B$ ,  $z^I$ ,  $z^B$ . It is easy to construct examples showing that  $\alpha^*$  may be bigger than  $\frac{1}{2}$ .

## 6. BARGAINING FOR A SHARE OF THE CONTROL BENEFITS

So far we have considered situations where a party makes a counterbid to permanently block the buyer from taking control. We now consider the case where an arbitrageur takes advantage of the voting rule to buy enough shares to threaten to block the buyer and thereby bargain for a share of the buyer's gains. For example, if the corporate charter specifies that a change in control requires 90% approval of shareholders, then an arbitrageur can purchase 11% of the votes and threaten to block any buyer. We assume that if the buyer does not choose a high enough tender price to discourage the entry of an arbitrageur, he will have to share the takeover gains with him. This has the effect of raising the price that the buyer must pay to acquire control.

In the model of Section 4, security holders desire a corporate charter which forces a buyer to purchase 100% of the company. However, under the new assumption about arbitrageur behavior, this need not be in the security holders' interest since such a rule makes it very easy for an arbitrageur to block the offer and demand a share of the gains. Even a buyer who would raise the value of the firm might find that the cost of deterring the entry of an arbitrageur is sufficiently high that he is discouraged from making an offer. Hence, we are able to explain values of  $\alpha < 1$ . In particular, we prove that if the buyer's private benefit is small, then the optimal  $\alpha$  is either  $\frac{1}{2}$  or 1. Further, for any private benefit, if buyers always raise the value of the firm to security holders then the optimal  $\alpha$  is never larger than  $\frac{2}{3}$ . In any case, as the buyer's private benefit gets smaller, the optimal  $\alpha$  gets closer to  $\frac{1}{2}$ . These results are obtained under the assumption of a one share/one vote security structure; we believe, however, that the main ideas generalize to arbitrary security structures.

The model has the same structure as in the previous sections, except

that after the buyer (B) makes an offer for  $\alpha$  of the votes, the arbitrageur (A) can make an offer for  $1 - \alpha$ . If A gets  $1 - \alpha$ , then B must negotiate with A for control. We assume that the outcome of the negotiations is that the gains from control are divided equally between the parties. That is,

(6.1) each party gets the status quo value of his shares plus  $\frac{1}{2}$  of the total gain created by the acquisition.<sup>1/</sup>

For example, suppose the charter specifies that a change in control requires a favorable vote of  $100\alpha = 70\%$  of the shareholders, and that there is a one share/one vote security structure (as noted, we assume this throughout this section). Suppose the status quo value (i.e., the value under the incumbent) is  $y^I = 100$ , and B can make the firm's shares worth  $y^B = 200$ . Further, suppose B will realize private value  $z^B = 20$ . In order to get the shareholders to tender their shares, B must make an offer of at least 200. Suppose he makes such an offer. Let A make a counteroffer to shareholders at a price just above 200 (say 201) for 30% of the shares. Since A is offering more than B, he will get just above 30% of the shares and have the ability to block B. Now, A and B negotiate and agree to split the gains from the takeover as in (6.1). The gain created by the takeover is the private value  $z^B = 20$  plus the appreciation in the value of the shares  $y^B - y^I = 200 - 100 = 100$ . Hence

$$\begin{aligned} \text{A gets } (.3)y^I + \frac{1}{2}(z^B + y^B - y^I) &= 90, \\ \text{B gets } (.7)y^I + \frac{1}{2}(z^B + y^B - y^I) &= 130 \end{aligned}$$

Note that these numbers represent gross benefits; they do not take into account the sunk cost of acquiring the shares. Indeed the acquisition costs

are  $(.3)(201) = 60.3$  for A and  $(.7)(200) = 140$  for B. Thus, in net, B loses money on the bid. Of course, B will anticipate this, i.e., he will not be willing to make an offer for 70% at a price of 200 per 100%. However, since shareholders must be offered at least 200 to get them to tender rather than hold on to their shares, there is no cheaper winning bid and B is simply discouraged from entering. This has the negative consequence of preserving the status quo.

Now consider the effect of lowering  $\alpha$  to .5 (i.e., majority rule). If A purchases just over .5, then his share of the gains is  $(.5)y^I + (.5)(z^B + y^B - y^I) = (.5)(100) + (.5)(120) = 110$ , and, of course, B receives an equal share. If B makes an offer for 50% of the shares at a price just above 220 per 100%, then it will be too costly for A to enter the bidding (he must offer above 220 for 50% which costs him above 110, and is larger than his share of the gains). The offer by B deters A from entering and competing against him. With A absent, B gets 50% of the shares at a total cost just above 110, and this is worth 120, composed of  $z^B = 20$  and the value of the shares  $(.5)(200)$ . Note that once B makes a sufficiently high offer that A is deterred, then B does not have to share his private benefit with A. Under B's offer, the target's shares are worth  $(.5)(220) + (.5)(200) = 210$ , which is much larger than their worth under a 70% rule.

We may summarize this example as follows. When the charter deviates from majority rule, then for a given offer price of the buyer, the arbitrageur's cost of threatening to block the buyer is lowered. Hence, the buyer must raise his tender price to deter A's entry. A sufficiently large deviation from majority rule lowers the cost to A of blocking to the point where B would only suffer losses from a successful offer. This can occur even with an offer which, if completed, would raise the market value of the firm, because a deviation from majority rule gives A both more than his pro rata

share of B's private benefit and more than his pro rata share of the public gains from improving the company. That is, given that the cost of shares purchased is sunk, B cannot be expected to recover the relatively high cost of purchasing  $\alpha > \frac{1}{2}$  in subsequent bargaining with an arbitrageur who has had to purchase only  $(1-\alpha) < \frac{1}{2}$ .

To elaborate on and generalize the above discussion, note that there are 2 cases to consider: Case (1) is where  $y^B + z^B > y^I$ , so that if A and B together own 100%, it is optimal for them to replace the incumbent; and Case (2) is where  $y^B + z^B \leq y^I$  and it is not optimal to replace the incumbent. In Case (1) note that if the voting rule requires B to get  $\alpha$  for control, and B makes an offer at a sufficiently low price that A enters to purchase  $1 - \alpha$ , then A will get

$$(6.2) \quad (1 - \alpha)y^I + \frac{1}{2} (y^B + z^B - y^I)$$

gross of the cost of acquiring  $1 - \alpha$ . In order to deter A from entering, the tender price P must be such that  $(1 - \alpha)P$  is just larger than (6.2), i.e.,

$$(6.3) \quad P = y^I + \frac{(y^B + z^B - y^I)}{2(1-\alpha)}.$$

This yields a profit to B of  $\alpha y^B + z^B - \alpha P$ , i.e.,

$$(6.4) \quad \text{B's profit} = \frac{1}{2(1-\alpha)} \{ 2\alpha (y^B - y^I) [\frac{1}{2} - \alpha] + 3z^B [\frac{2}{3} - \alpha] \}.$$

In the case where (6.4) is positive, a bid will take place and the firm will have a market value of  $\alpha P + (1-\alpha)y^B$ . Using (6.3) to eliminate P, we conclude that shareholder return satisfies

$$(6.5) \quad \text{If } y^B + z^B > y^I, \text{ then } r(\alpha) = \begin{cases} \frac{\alpha(2\alpha-1)}{2(1-\alpha)} [y^B + z^B - y^I] + \alpha z^B + y^B & \text{when B's profit is positive,} \\ y^I & \text{when B's profit is negative.} \end{cases}$$

Examination of (6.5) shows that shareholders prefer a higher  $\alpha$  as long as it doesn't drive B's profit negative (since a higher  $\alpha$  raises the tender price and the amount purchased). From (6.4), if  $y^B > y^I$ , then B's profit is negative if  $\alpha > \frac{2}{3}$ . It follows that there will be no bids in this case if  $\alpha > \frac{2}{3}$ . If  $y^B < y^I$ , the analysis is somewhat more involved, and  $\alpha > \frac{2}{3}$  may be optimal. Define  $x$  to be the ratio of private benefits to the total net acquisition benefits:

$$(6.6) \quad x = \frac{z^B}{y^B + z^B - y^I}.$$

If  $y^B < y^I$  then  $x > 1$ . It can be shown that B's profit is zero at an  $\alpha$  which we denote by  $\alpha(x)$  where

$$(6.7) \quad \alpha(x) = \frac{4x-1-\sqrt{(1+8x)}}{4(x-1)},$$

and further, when  $\alpha > \alpha(x)$ , B's profit is negative for realizations of  $(\tilde{y}^B, \tilde{y}^I, \tilde{z}^B)$  such that  $\tilde{x} = \tilde{z}^B / (\tilde{y}^B + \tilde{z}^B - \tilde{y}^I) < x$ .<sup>2/</sup> Therefore in Case (1), if shareholders knew that  $\tilde{x} < x$  for sure they would never choose  $\alpha > \alpha(x)$ .

Examination of (6.6) and (6.7) shows that as  $z^B$  goes to zero,  $\alpha(x)$  goes to  $\frac{1}{2}$ . Further, by evaluating (6.7), we see that: if  $x = 1$ , then  $\alpha < \alpha(1) = \frac{2}{3}$ ; if  $x = 2$  then  $\alpha < \alpha(2) = .72$ ; if  $x = 3$ , then  $\alpha < \alpha(3) = .75$ , etc.

In Case 2 where  $z^B + y^B \leq y^I$ , then B need not worry about deterring A, since if B accumulates  $\alpha$  and A accumulates  $1 - \alpha$ , they will find it in their mutual interest to keep the incumbent in power; hence there will be no benefits to divide. In this case the best offer for B is one for 100% at a price of  $y^I$ . This yields:

$$(6.8) \quad B's \text{ profit} = \alpha y^B + z^B - \alpha y^I,$$

and the shareholder return satisfies:

$$(6.9) \quad \text{If } z^B + y^B \leq y^I \text{ then } r(\alpha) = \begin{cases} \alpha y^B + (1-\alpha)y^I & \text{if B's profit} \\ & \text{is positive.} \\ y^I & \text{if B's profit} \\ & \text{is negative.} \end{cases}$$

A crucial feature of this case is that changes in control are not in the shareholder's interest. Further, when  $\alpha$  is raised above 50%, there are fewer values of  $(y^B, z^B, y^I)$  for which B can make a profitable bid and in the cases where a profitable bid is made shareholders receive a higher return (since a higher  $\alpha$  leads to more shares taken up at the premium tender price; cf. Section 4).

These results allow us to establish the following:

Proposition 7: The corporate charter will specify a voting rule for control changes  $\alpha$ , which is either (a) sufficiently high so that no control change can occur without the incumbent's approval or (b) lies between  $\frac{1}{2}$  and  $\alpha(x)$  where  $x$  is the largest possible ratio of private benefits to total acquisition benefits. In Case (b), if  $x = 1$  then it is optimal to choose an  $\alpha$  between  $\frac{1}{2}$  and  $\frac{2}{3}$ . Further, in case (b) if  $z^b$  is sure to be less than  $\bar{z}^b$ , then as  $\bar{z}^b$  tends to zero,  $\alpha$  tends to  $\frac{1}{2}$ , i.e., in the limit we have majority rule.

This result follows from the fact that to the extent that Case (2) obtains (i.e., the incumbent is more productive than the buyer) shareholders want to prevent control changes, while in Case (1) shareholders never need to choose  $\alpha$  larger than  $\alpha(x)$  to discourage control changes, and indeed would want  $\alpha$  less than  $\alpha(x)$  to encourage beneficial control changes.

## 7. FURTHER REMARKS

### A. More Complex Securities

So far we have analyzed the optimal voting structure in a context where all claims to income are proportional, i.e., each security is characterized by a share "s" of profit. We have thus excluded debt, warrants, convertible debentures, etc. To incorporate such securities in the model we would have to consider non-linear sharing rules, say which give the  $i^{\text{th}}$  security a function  $f_i(y)$  of total profit  $y$ . It can be shown that if these functions are restricted to be non-decreasing in profit, then (if private benefits are small) an optimal voting/security structure will consist of a combination of riskless debt and one share/one vote common stock.

Another restrictive assumption made is that the charter specifies voting rights to be independent of future information. This excludes risky debt where a default event shifts control (i.e. votes) from equity holders to debt holders. It also excludes non-voting preferred shares which obtain voting rights consequent to a series of low dividend payments. A careful analysis of such state contingent voting rights would involve studying a multiperiod model, and this is deferred to future work. However we think that the basic principle which we have identified will still apply: tying votes to shares on a one to one basis is most likely to cause control to shift to an outsider who will raise the market value of the firm.

The above draws attention to a further restrictive assumption, namely that the voting/security structure is responsible for allocating control, while the managerial compensation scheme is responsible for assuring that management maximizes profit to the best of its ability. In reality, the allocation of control and the managerial compensation scheme are not



completely separable. An entrepreneur who sets up a corporation will make various investments of time and other resources, for which adequate compensation may be impossible unless the entrepreneur possesses the residual rights inherent in control.<sup>1/</sup> For this reason, parties to the initial capitalization of the corporation will try to allocate control changes in a manner which is as sensitive to public information as is feasible. For example, in the case of debt, the contract will explicitly define default events in which failure to make an immediate payment in full will shift control from management to debt holders. Presumably, the award of ordinary voting rights, which, independent of a default event, would allow the debt holders to achieve control gives insufficient protection to the entrepreneur (and possibly other security holders) relative to its benefits.<sup>2/</sup>

#### B. More Complex Takeover Bids

Our analysis has considered takeover bids which involve specifying a price per share and a total number of shares which the offeror is willing to accept. There are more complicated offers which are theoretically feasible. For example, in the case of one share/one vote, the acquirer could offer to pay a high price per share if he gets less than alpha, and a low price per share if he gets more than alpha. In such a case the acquirer could win at the low price, since if everyone thinks that he will get less than alpha, then they tender shares to him, and it is thus not an equilibrium for him to get less than alpha. Depending on the particular type of competition among bidders it is possible that a one share/one vote security structure loses its ability to protect shareholder property rights and to allocate control to a high value bidder. However, other security structures will not do better.

We have assumed throughout that it is illegal or infeasible to sell votes separated from shares. If an investment bank could profitably unbundle

votes from shares, and repackage a firm's security/voting structure, then security holders would not be able to protect themselves from high private benefit but low security benefit acquisitions.<sup>3/</sup> However the opening of a market in votes appears to be illegal; see Easterbrook and Fischel (1983).

In Section 5, we considered how the surplus-extraction role of the security/voting structure can be in conflict with the allocational role in the presence of private benefits possessed by the incumbent or the acquiror. Our analysis and results would be essentially unchanged if, instead of considering competition between the acquiror and the incumbent, we had considered competition between two acquirors.<sup>4/</sup>

## 8. CONCLUSIONS

We conclude with some remarks as to the relevance of our model to the current policy debate as to whether a corporation should be required to have a one share/one vote security structure as a condition for listing on various physical or electronic stock exchanges. First, our results show that deviations from one share/one vote can be a characteristic of a corporate charter which is in security holders' best interest. We thus see no reason to interfere with the ability of a new company to choose a corporate charter and security structure which gives it the lowest cost of raising capital.

Our analysis has not, however, dealt with the issue of a change in the security/voting structure by an old company which has a one share/one vote charter. Nevertheless, we would view such a change with suspicion. If such a corporation changes its structure so that incumbent management is entrenched and isolated from the market for corporate control, then our result that one share/one vote is generally in security holders' interest, and the fact that managerial entrenchment is in the managers' self interest, leads us to believe that it is possible that security holders will be harmed. We would hold this

view even if a majority (or 2/3) of shareholders voted for the change. The role of the market for corporate control derives from the fact that it is generally optimal for small shareholders to vote with management, and not devote the time and effort to read proxy statements and form an independent view. Hence, the fact that shareholders vote for a withdrawal from the corporate control market is no defence of management's position.

The above observation may apply with less force to a corporation where management already holds a majority of the votes, and wants to change the voting structure so that it may hold fewer shares of profit, yet still maintain voting control. For example, a family may desire to raise capital for other projects, or to diversify some of its wealth out of a company which it founded. Such a family does not necessarily want to sell its shares, since this would entail a loss of voting control, so it separates its shares from its votes by creating a class of shares with lower dividend claims but higher votes than common shares. To the extent that initial shareholders expected management to maintain voting control, then this change in security structure is consistent with the original desire of security holders to isolate the company from the corporate control market, and hence should not be interfered with. Of course, this conclusion would not be valid if shareholders' expectations were instead that management would sell its combined shares and votes at this point and relinquish control.

Even if it is undesirable to allow ex-post changes in security/voting structures, this has no particular implication for legislation regarding listing requirements. An Exchange's listing requirements are an attempt to provide information to traders about the characteristics of the securities being traded. (Until recently, a trader of shares on the New York Stock Exchange would know, merely from the fact that the firm was trading on the NYSE, that all equity of the company had one share/one vote.) We see no

reason why traders cannot obtain information elsewhere regarding the voting structure of the firm. But we also see no reason why an Exchange should be prevented from specializing in the trading of shares with a particular voting structure if it wishes to do this.<sup>5/</sup>

To the extent that ex-post changes in security/voting structure should receive further regulation, then, instead of regulating listing requirements, it would seem more appropriate to award dissenting rights to shareholders of the type that they already have in mergers, or other asset sales. In particular, dissenting shareholders could be given rights of appraisal which would allow them to attempt to show that the value of their holdings has fallen under the proposed change in security/voting structure.

## APPENDIX

We begin by defining an equilibrium when there is a contest between two bidders (see Section 4). Denote the bids by  $(p_1^B, \dots, p_n^B; f_1^B, \dots, f_n^B)$  and  $(p_1^O, \dots, p_n^O; f_1^O, \dots, f_n^O)$ , where  $o$  stands for opposition ( $o = A$  or  $I$ ).

Faced with these two bids, a holder of security  $i$  has three choices. He can tender to  $B$ , earning a return  $p_i^B$  on those securities taken up and  $s_i y^W$  on those returned where  $W$  is the winner of the subsequent voting contest; he can tender to  $O$ , earning a return  $p_i^O$  on those securities taken up and  $s_i y^W$  on those returned; or he can hold on to his shares, earning a return of  $s_i y^W$ . Under rational expectations, each investor is supposed to be able to forecast the total amounts tendered to  $B$  and  $O$ ,  $x_i^B$ ,  $x_i^O$ , and the ultimate winner,  $W$ , and thus determine which of these choices is best (note that there is no aggregate uncertainty). This leads to the following definition of equilibrium.

Definition. Given the bids  $b^B = (p_1^B, \dots, p_n^B; f_1^B, \dots, f_n^B)$  and  $b^O = (p_1^O, \dots, p_n^O, f_1^O, \dots, f_n^O)$ , an equilibrium consists of a vector  $((x_i^B, x_i^O); i = 1, \dots, n)$ , where  $x_i^j$  is the fraction of security  $i$  tendered to  $j$  ( $j = B, O$ ), and a winner  $W = B$  or  $O$  of the subsequent voting contest, such that:

$$(1) \quad x_i^B, x_i^O \geq 0, \quad x_i^B + x_i^O \leq 1 \quad (\text{for all } i);$$

$$(2) \quad (x_i^B, x_i^O) \text{ solves: } \underset{(x_i^B, x_i^O)}{\text{maximize}} \quad x_i^B \{ p_i^B \min \left( \frac{f_i^B}{x_i^B}, 1 \right) + s_i y^W \max \left( 1 - \frac{f_i^B}{x_i^B}, 0 \right) \}$$

$$+ x_i^O \{ p_i^O \min \left( \frac{f_i^O}{x_i^O}, 1 \right) + s_i y^W \max \left( 1 - \frac{f_i^O}{x_i^O}, 0 \right) \}$$

$$+ (1 - x_i^B - x_i^O) s_i y^W \quad (\text{for all } i),$$

subject to  $x_i^B \geq 0$ ,  $x_i^O \geq 0$ ,  $x_i^B + x_i^O \leq 1$ , where  $y^O = y^I$ ;

$$(3) \quad \text{If } \min_{i=1}^n (f_i^B, \hat{x}_i^B) v_i \geq \alpha$$

then  $W = B$ ; otherwise  $W = O$ .

(2) says that shareholders' tender decisions are profit maximizing given their expectations about the outcome of the control contest and given the fact that since they are small they will have a negligible effect on this outcome (note that since all security holders face the same maximization problem, we can consider just the representative security holder). (3) tells us who wins the subsequent voting contest.

It is worth noting that in some circumstances there can be multiple equilibria in a voting contest; in particular, B may win if he's expected to, while O may if he's expected to. However, there are no stochastic equilibria, since if B is expected to win with some probability, this leads to deterministic tender decisions  $(\hat{x}_i^B, \hat{x}_i^O)$  in the aggregate and hence, by (3), to a deterministic winner B or O. There may also be cases where there is no equilibrium at all.

It is straightforward to compute the profits of B and O from the bidding contest. Let  $\lambda_j^W = 1$  if  $W = j$ ,  $\lambda_j^W = 0$  otherwise. Then B and O's profits are:

$$(4) \quad \pi^B(b^B, b^O) = \sum_{i=1}^n \min(f_i^B, \hat{x}_i^B) (s_i y^W - p_i^B) + \lambda_B^W z^B,$$

$$(5) \quad \pi^O(b^B, b^O) = \sum_{i=1}^n \min(f_i^O, \hat{x}_i^O) (s_i y^W - p_i^O) + \lambda_O^W z^O,$$

since each unit of security  $i$  tendered to  $j$  costs  $p_i^j$  and is worth  $s_i y^W$ . It is clear from (2) that if  $p_i^j < s_i y^W$ , the rate of return to investors from tendering to  $j$  is less than that from holding on to security  $i$ , and so  $\hat{x}_i^j = 0$ .

It follows that

$$\begin{aligned} \pi^B(b^B, b^O) &\leq \lambda^W z^B, \\ (6) \quad \pi^O(b^B, b^O) &\leq (1-\lambda^W) z^O, \end{aligned}$$

which proves Lemma 1.

Proof of Lemma 2. Observe that B's profit in the absence of a counter-bid by A is

$$(7) \quad \pi^B = \sum_{i=1}^n f_i^B \text{Min}(s_i y^B - p_i^B, 0) + z^B$$

since all of security  $i$  will be tendered to B if  $s_i y^B < p_i^B$  and none if  $s_i y^B > p_i^B$ . (4.2) and  $y^B < y^I$ , however, imply that  $f_i^B(p_i^B - s_i y^B) \geq s_i(y^I - y^B)$ .

Hence  $\pi^B \leq \sum_{i=1}^n s_i(y^B - y^I) + z^B = z^B - (y^I - y^B)$ . Q.E.D.

Proof of Lemma 3. Necessity is clear since  $\bar{b}^A$  makes zero profit if A wins (and an equilibrium can easily be shown to exist in the  $b^B - \bar{b}^A$  contest). To establish sufficiency, suppose not, i.e. while  $b^B$  wins against  $\bar{b}^A$  it doesn't win against another bid  $\hat{b}^A$ , which makes nonnegative profit for A. Without loss of generality we can assume  $\hat{p}_i^A \geq s_i y^I$  for all  $i$ , since otherwise A gets none of security  $i$  tendered to him in the  $W = A$  equilibrium (investors will free-ride). Also  $\hat{p}_i^A > s_i y^I$  and  $\text{Min}(f_i^A, \hat{x}_i^A) > 0$  is inconsistent with A's profit being nonnegative, and so we may suppose  $\hat{p}_i^A = s_i y^I$  for all  $i$ . But this means that  $\hat{b}^A$  is the same bid as  $b^A$  but with restrictions. It follows immediately that if  $W = A$  is an equilibrium in the  $(b^B, \bar{b}^A)$  contest, it is also one in the  $(b^B, \hat{b}^A)$  contest. Contradiction. Q.E.D.

Proof of Proposition 1. We establish first that the bid  $p_i^B = s_i y^I + \epsilon$ ,  $f_i = f_i^*$  will deter A. By Lemma 3, it is enough to show that this bid will win against  $\bar{b}^A$ . To see this, note that since B is offering slightly more for each security  $i$ , he must get at least what he asks for, i.e.  $x_i^B \geq f_i^*$ . (If  $x_i^B < f_i^*$ , tendering to B is a dominant strategy and so  $x_i^B = 1$ .) But it follows that B will accumulate at least  $\alpha$  votes and will win any voting contest against A; therefore  $W = B$ .

We establish next that any bid  $b^B$  that deters A costs B more than  $S^*(y^I - y^B)$ . By Lemma 3,  $b^B$  must win against  $\bar{b}^A$ . Let  $I = \{i | p_i^B > s_i y^I \text{ and } f_i^B > 0\}$ . Then  $\sum_{i \in I} f_i^B v_i \geq \alpha$  since, otherwise, in a contest with  $\bar{b}^A$ , there is an equilibrium in which the holders of all securities  $i \in I$  tender to A, and B has less than  $\alpha$  votes and loses. Given that  $b^B$  does deter A, B's profit is given by

$$\pi^B = \sum_{i \in I} f_i^B (s_i y^B - p_i^B) + \sum_{i \notin I} \min(f_i^B, x_i^B) (s_i y^B - p_i^B) + z^B.$$

Note that  $s_i y^B > p_i^B \Rightarrow x_i^B = 0$ . Hence the second term is nonpositive and so

$$\begin{aligned} \pi^B &< \left( \sum_{i \in I} f_i^B s_i \right) (y^B - y^I) + z^B \\ &\leq S^* (y^B - y^I) + z^B, \end{aligned}$$

since  $\sum_{i=1}^n f_i^B v_i \geq \alpha \Rightarrow \sum_{i=1}^n f_i^B v_i \geq S^*$ .

Q.E.D.

Proof of Lemma 4. Since  $f_1 = \dots = f_n = \alpha$  is feasible in the minimization problem described in Proposition 1,  $S^* \leq \sum_{i=1}^n \alpha s_i = \alpha$ , which proves the first part of the claim. To prove the second part, note that the first order conditions for the linear programming problem imply that the solution cannot



be interior unless  $(s_1/v_1) = \dots = (s_n/v_n)$ . Q.E.D.

Proof of Proposition 3. It follows from (4.6) that market value is increasing in  $S^*$ . Now apply Lemma 4. Q.E.D.

Proof of Proposition 4. The result follows directly from the fact that  $S^*$  achieves a maximum of 1 uniquely under one share/one vote and  $\alpha = 1$  (see Lemma 4). Q.E.D.

Before establishing Propositions 5 and 6, it is necessary to be precise about the meaning of sufficiently small and negligible. Let the probabilities of the four cases in Section 5 be  $\pi_1(t)$ ,  $\pi_2(t)$ ,  $\pi_3(t)$ ,  $\pi_4(t)$ , respectively, where  $t$  is a parameter. Suppose also that  $\pi_i(t)$  is continuous in  $t$  for all  $i$  and that the distribution of  $(y^I, z^I, y^B, z^B)$  conditional on Case  $j$  occurring is independent of  $t$  for all  $j$ .

Proposition 5: Assume that  $\pi_1(t)$ ,  $\pi_4(t) \rightarrow 0$  as  $t \rightarrow 0$ , but that  $\pi_2(t)$  is bounded away from zero. Suppose also that  $(*)$   $\text{Prob}[z^I < \gamma(y^B - y^I) \mid z^B = 0, z^I = \bar{z}^I, y^B > y^I]$  is strictly increasing in  $\gamma$ ,  $0 \leq \gamma \leq \frac{1}{2}$ . Then the following is true for small enough  $t$ : given any combination of a security structure  $(s_1, \dots, s_n; v_1, \dots, v_n)$  and plurality  $\alpha$ , with either  $(s_i/v_i) \neq 1$  for some  $i$  or  $\alpha > \frac{1}{2}$ , one share/one vote and  $\hat{\alpha} = \frac{1}{2}$  yields a strictly higher expected return than this combination.

Proof. Take limits as  $t \rightarrow 0$ . Then only Cases 2 and 3 are relevant. In Case 3, security structure does not affect shareholder return. In Case 2, one share/one vote and  $\hat{\alpha} = \frac{1}{2}$  yields a strictly lower value of  $\hat{S}$  than any other

security structure and plurality (by Lemma 5 and (\*)), and hence a higher return to security-holders. The result follows. Q.E.D.

Proposition 6: Assume that there is a positive probability that  $y^I < y^B + z^B$  given that  $z^I = 0$ ,  $z^B = \bar{z}^B$  and  $y^B < y^I$ . Assume also that  $(\pi_4(t)/\pi_1(t)) \rightarrow 0$ ,  $(\pi_4(t)/\pi_2(t)) \rightarrow 0$  as  $t \rightarrow 0$ . Then the following is true for small enough  $t$ : given any security structure  $(s_1, \dots, s_n; v_1, \dots, v_n)$  with  $s_i/v_i \neq 1$  for some  $i$ , and a plurality  $\alpha$ ,  $\frac{1}{2} \leq \alpha \leq 1$ , one share/one vote and the plurality  $\alpha$  yield a strictly higher expected return.

Proof. Take limits as  $t \rightarrow 0$ . Then Case 4 becomes negligible relative to Cases 1, 2 and 3. A move to one share/one vote (keeping  $\alpha$  constant) strictly increases  $S^*$  and  $\hat{S}$  and hence raises shareholder return in Cases 1 and 2 (in Case 1, strictly). Shareholder return in Case 3 is unaffected. The result follows. Q.E.D.

FOOTNOTES FOR SECTION 1

- 1/ Fischel (1986, p.16) notes that large shareholders have better incentives to monitor management than do small shareholders and that "one share/one vote recognizes this economic reality by assigning votes and thus the ability to monitor managers, in direct proportion to shareholders' stake in the venture". DeAngelo and DeAngelo (1985, p.37) recognize that a one share/one vote rule does not assign effective votes in direct proportion to shares, since under majority rule someone with 50.1% of the shares has 100% of the effective votes.
- 2/ See Manne (1965) and Marris (1964).
- 3/ We therefore ignore proxy fights as a means for an outsider to get control. However proxy fights do sometimes occur; see Dodd and Warner (1983).
- 4/ It should be noted that ours is not the first attempt to develop a formal model of security structure. Blair, Gerard and Golbe (1986) also construct a model of the relationship between security structure and takeover bids. However, they exclude private benefits of control and find that security structure is irrelevant in the absence of taxes.
- 5/ It should be noted that voting rights are most important to security holders who are not promised a particular payout, but instead a claim to discretionary payments. Thus, our theory excludes default free debt, and preferred stock issues which are equivalent to such debt. Similarly, another deviation from one share/one vote involves mutual insurance companies, banks, and investment funds, where the takeover bid mechanism cannot operate to effect control changes. In such firms, the

types of activities engaged in are more severely circumscribed by charter provisions than is the case in the typical common stock corporation. This, combined with industry regulation and competition reduces somewhat the discretionary character of the payments given to security holders. See Mayers and Smith (1986) for an analysis of mutual vs stock insurance companies.

- 6/ See Eisenberg (1976) for a discussion of fiduciary responsibility, and Fischel (1983) for a discussion of the appraisal remedy and of Weinberger v. UOP.
- 7/ Indeed there is a growing body of evidence that acquirers in hostile takeovers do not significantly benefit from the acquisition; see Jensen and Ruback (1983, p.22).
- 8/ The private benefits may have been created by sunk investments of managerial effort, and hence may represent a return to these activities which the initial security holders were willing to pay for.
- 9/ If a compensation agreement were used when private benefits are large, the compensation ("golden parachute") would have to be large. Clearly, compensation which is a significant percentage of the market value creates moral hazards which might lead the incumbent to induce a control change even if it did not raise market value. More to the point, the best compensation rule would involve giving the incumbent a share of market value, but when the private benefits are large this has negative risk bearing consequences, and hence can be a very costly method of inducing the incumbent to allow the market to decide who should have control.

FOOTNOTES FOR SECTIONS 2 - 5

- 1/ If  $\alpha < \frac{1}{2}$ , a situation can arise where two or more parties have enough votes to choose management. In order to avoid such an ambiguous situation, we constrain  $\alpha$  to be at least half.
- 2/ We assume that voting rights matter only because of their role in determining the corporation's management. Lease, McConnell, and Mikkelson (1984, p.451) have pointed out that possession of voting rights may subject the holder to legal claims from shareholders without voting rights; we ignore this possibility.
- 3/ We take  $(y, z)$  to be exogenous for B and I. In a richer model  $(y, z)$  would depend on managerial actions and would be endogenous (for an analysis of managerial agency problems in the presence of takeover bids, see Scharfstein (1986)).
- 4/ There is another equilibrium where shareholders think that the buyer will succeed with an offer of 5 and tender to him; each shareholder correctly expecting success knows that his shares will be worth  $y^B = 3$  if he does not tender, while if he does tender he has a chance of getting 5. As we will see in the next Section, this "equilibrium" will disappear when some shareholder can act as an arbitrageur and preserve the status quo by making a counteroffer at 100 per share.
- 5/ If we do not include the possibility of arbitrageur entry, then security structure may make no difference at all. As noted in Footnote 4, there is an equilibrium where the low value buyer succeeds because all shareholders think that he will succeed even under one share/one vote. That is, shareholder competition can be ineffective. The existence of the arbitrageur will eliminate many of these "multiple equilibria"

problems.

- 6/ This is the free rider problem discussed in Grossman-Hart (1980). Note that we ignore the possibility that the corporate charter explicitly allows a successful bidder to dilute minority shareholder property rights by diverting company profits to himself, e.g. in the form of salary (the private benefits  $z$  do, however, represent an implicit dilution of such property rights). However, see Demsetz (1983) on the existence of large shareholders and Vishny and Shleifer (1986) on their role in reducing the free-rider problem.
- 7/ See Fishman (1986) for a model of preemptive bidding under asymmetric information.
- 8/ If  $z^B = 0$ , B is indifferent between taking control and not; we assume that he does take control.
- 9/ We assume that the transactions cost to A of making the bid is sufficiently small to be ignored (alternatively, the preoffer shares held by A go up in value by enough to cover the transaction cost).
- 10/ In fact if B's offer price is 101, say, the equilibrium involves a fraction  $x$  tendering their shares to B where

$$\left(\frac{5}{x}\right) 101 + \left(1 - \frac{5}{x}\right) 80 = 100,$$

(i.e.,  $x = 10/21$ ); here the right-hand side is the value of tendering to A and the left-hand side is the value of tendering to B.

- 11/ See Fischel (1985) for a review of the appraisal remedy. In the U.K., the London Stock Exchange's Panel on Take-overs and Mergers restricts the ability of a buyer to deviate from paying the same price for all 100% of the shares; see Roell (1986). Note, however, that to the extent a buyer can always engage in some open market purchases prior to a

tender offer it is impossible to eliminate a buyer's ability to pay more per share for some shares than for others.

- 12/ Contests between incumbent management and an outsider have been analyzed in different contexts by Harris-Raviv (1985) and Blair, Gerard and Golbe (1986). See also Baron (1983) and Stein (1986) for a discussion of other forms of managerial resistance.
- 13/ Note that if  $\hat{p}_i^B < s_i y^B$ , no class  $i$  shareholder tenders and the value of class  $i$  shares is  $s_i y^B$ .
- 14/ The reader may wonder whether greater competition between  $B$  and  $I$  could also be generated by sticking to one share/one vote and raising  $\alpha$  above  $\frac{1}{2}$ . This is indeed the case in this example (set  $\alpha = 99\%$ ); however, more complicated examples can be constructed where departures from one share/one vote are desirable even when  $\alpha$  is set optimally.
- 15/ The only possible difference between this case and Section 4 is that  $I$ , unlike  $A$ , might try to block a value-increasing bid. However such bids only occur when  $y^B > y^I$  (see Proposition 1) and, under these conditions,  $I$  cannot afford to block since this would require him to purchase securities at  $s_i y^B$  which are only worth  $s_i y^I$  to him ( $I$ 's private benefit is zero).
- 16/ One difference between this case and the preceding one should be noted. In Section 4, when  $B$  obtained control in spite of being inferior for shareholders (i.e.  $y^B < y^I$ ), the market value of the firm fell, but not all the way to  $y^B$  (in fact to  $S y^I + (1-S) y^B$ ); the reason is that  $B$  had to disgorge some of his private benefit to deter  $A$ . In the present case, when  $I$  retains control in spite of being inferior, the market value of the firm is  $y^I$ , i.e.  $I$  is not forced to disgorge any of  $z^I$ . The asymmetry is caused by our assumption that  $B$  moves first and only makes an offer if he can win; hence when  $I$  retains control, he does so

by default -- B will not even bother to make a bid. An alternative approach, which would preserve symmetry, is to suppose that in order to retain control I must make an offer which deters B.

- 17/ One difference from Section 4 is that one share/one vote does not reduce shareholders' loss in the event that a superior buyer fails to win control. The reason for this is explained in footnote 16.
- 18/ The one exception to this statement occurs when there is a security consisting of pure votes ( $s_i = 0$ ), in which case  $s_i y^B = s_i y^I$ . This structure is inferior to all others in Case 3, however, and so will be disregarded.

#### FOOTNOTES FOR SECTION 6

- 1/ See Binmore, Rubinstein and Wolinsky (1986) for an explicit model of bargaining where this is the "subgame perfect equilibrium" outcome. Such a model assumes that the two parties receive the flow of benefits under the status quo while they bargain, and that after they agree on a division of the gains, the incumbent is removed. Note that B cannot just call an election and expect A to vote for him for free, because it is assumed that A knows that if he votes against B, then there will be another round of bargaining where B will offer A money for his shares.
- 2/ To see this, write (6.4) as

$$B's \text{ profit} = \left( \frac{V^B + Z^B - V^I}{1 - \alpha} \right) [\alpha(\frac{1}{2} - \alpha) + x(1 - \alpha)^2].$$

Note for  $\alpha > \frac{1}{2}$  this is decreasing in  $\alpha$ , and (6.7) gives the  $\alpha$  such that  $\alpha(\frac{1}{2} - \alpha) + x(1 - \alpha)^2 = 0$ . Further in Case (1), B's profit is negative if  $x < \tilde{x}$  and  $\alpha > \alpha(x)$ .



FOOTNOTES FOR SECTIONS 7 AND 8

- 1/ See Grossman and Hart (1986) for an analysis of the determinants of the allocation of control rights.
- 2/ See Aghion and Bolton (1986), and Jensen and Meckling (1976) for a discussion of this and some related points.
- 3/ Conversely, if a corporation had a suboptimal voting/security structure an investment bank could profitably repackage the securities and votes to be in the form of one share/one vote.
- 4/ One difference is that setting  $\alpha > .5$  would make the model closer to Section 6 than to Section 5. The reason is that the latter model assumes that the acquisition of  $(1 - \alpha)$  by one of the bidders entitles him to the private benefits of control. This makes sense when we interpret one of the bidders as the incumbent, but does not make sense if neither bidder is the incumbent. The results on the optimality of one share/one vote would remain unchanged.
- 5/ See Gordon (1986) for an alternative point of view, however.

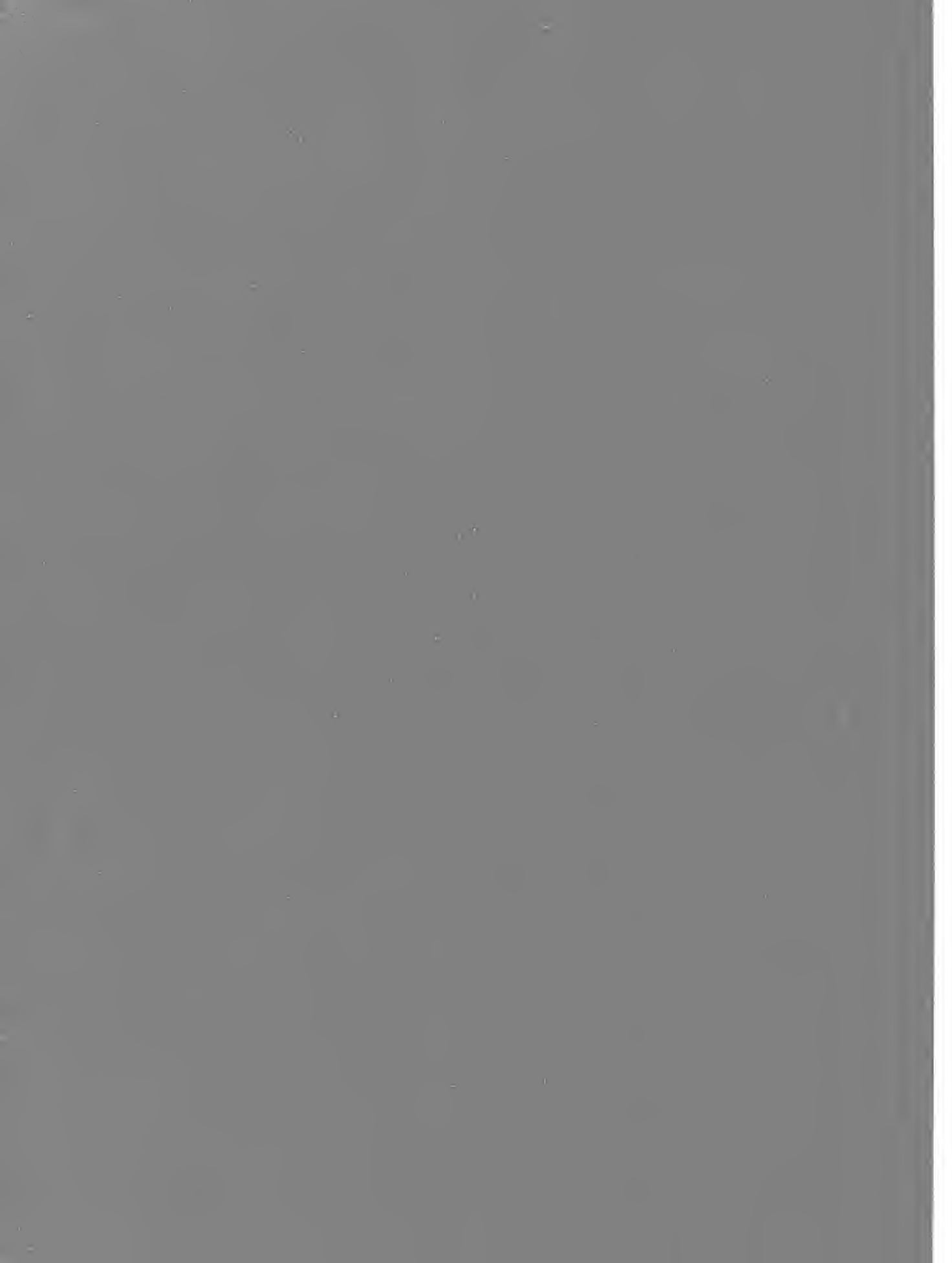
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